

# PATENT ABSTRACTS OF JAPAN

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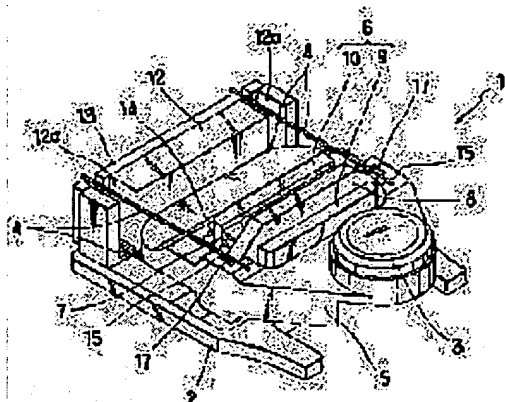
(72)Inventor : KUBO TAKESHI

## (54) BIAXIAL ACTUATOR FOR OPTICAL PICKUP DEVICE

### (57)Abstract:

**PURPOSE:** To miniaturize the biaxial actuator of an optical pickup device by contriving the shapes and the arranging positions of the tracking coil and the focusing coil thereof.

**CONSTITUTION:** A coil substrate 8 is formed by laminating four sheets of thin printed boards 8a, 8b, 8c and 8d. On the respective boards 8a, 8b, 8c and 8d, focusing coil elements 19, 19,... and tracking coil elements 20, 20,... are formed as a circuit pattern.



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CLAIMS

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[Claim(s)]

[Claim 1] The biaxial actuator of the optical pickup characterized by forming a focusing coil and a tracking coil as a circuit pattern on the same flat surface of a printed circuit board.

[Claim 2] The biaxial actuator of the optical pickup according to claim 1 characterized by making the printed circuit board which formed the focusing coil and the tracking coil as a circuit pattern two or more sheet superposition, and a focusing coil and a tracking coil not lap in the thickness direction of a printed circuit board.

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## DETAILED DESCRIPTION

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[Detailed Description of the Invention]

[0001]

[Industrial Application] This invention relates to the biaxial actuator of a new optical pickup. It is going to offer the biaxial actuator of the new optical pickup which can make brief the gap of a magnet and an outside yoke, i.e., a field, while attaining a miniaturization in detail by devising the configuration and arrangement location of a tracking coil and a focusing coil of a biaxial actuator, and can make actuation effectiveness good.

[0002]

[Description of the Prior Art] As for the tracking coil and focusing coil in a biaxial actuator of an optical pickup, what wound and formed copper wire was common.

[0003] Drawing 9 and drawing 10 show an example of the biaxial actuator a of the conventional optical pickup.

[0004] The tabular base substrate b of eye \*\* thickness with which the biaxial actuator a carried out the rectangle The parallel links d and d of four where the end was supported by printed circuit board c which protruded from the end section of this base substrate b, and ..., The lens attachment component f which holds objective lens e while being supported between these parallel links d and d and the rotation edge of ... The focusing coil g for actuators attached in this lens attachment component f, and the tracking coils h and h, While being attached on the above-mentioned base substrate b, it consists of the magnet j attached in the yoke i which carried out the shape of U character arranged so that some of focusing coils g and tracking coils h and h may be inserted from both sides, and this yoke i.

[0005] The base substrate b consists of a non-magnetic material, and Bore k is formed in a part for the other end flank of the longitudinal direction.

[0006] While consisting of the metallic material with which the parallel links d and d and ... have conductivity and supporting the lens attachment component f as mentioned above, between the predetermined circuit pattern on printed circuit board c, and the above-mentioned focusing coil g and the tracking coils h and h is connected electrically, and feed of the focusing coil g and the tracking coils h and h is performed.

[0007] The lens attachment component f consists of the non-magnetic material which carried out tabular [ of the abbreviation rectangle of eye \*\* thickness ], and the above-mentioned objective lens e is attached in the location which visited the other end edge of the longitudinal direction of the lens attachment component f, and the hole l of the rectangle which carried out opening comparatively greatly is formed in the abbreviation center section.

[0008] And such a lens attachment component f is in the condition supported by the above-mentioned printed circuit board c through the parallel links d and d of four, and ... Two pieces in which the above-mentioned objective lens e is located above the bore k of the base substrate b, and the above-mentioned yoke i carries out phase opposite while being located in the above-mentioned base substrate b and abbreviation parallel (it is hereafter called an "inner yoke" and an "outside yoke", respectively.) m and n are located with \*\*\*\*\* in the rectangle hole l. In addition, the piece by the side of printed circuit board

c is the inner yoke m among Yokes i, and the piece by the side of objective lens e is the outside yoke n. [0009] Yoke i bends the plate-like part material which consists of a magnetic material in the shape of U character, is formed, it is the sense which carries out opening to the abbreviation center section of the above-mentioned base substrate b toward the upper part, and it is arranged so that the inner yoke m and the outside yoke n may estrange in the longitudinal direction of the base substrate b.

[0010] Magnet j is attached in the medial surface of the inner yoke m, and, thereby, Field o is formed between this magnet j and the outside yoke n.

[0011] The focusing coil g winds and grows into rectangular-head tubed, looks at copper wire at a flat surface, the three sides are stuck on the common-law marriage except the common-law marriage by the side of objective lens e from the inside among the four sides among the inner circumference edges of the above-mentioned rectangle hole l of the lens attachment component f, and thereby, one side by the side of objective lens e of the focusing coil g is located so that it may build over two Men and the fields as for which the rectangle hole l carries out phase opposite.

[0012] The tracking coils h and h wind copper wire spirally [ a rectangle ], change, are attached in the lateral surface of one side which is not stuck on the inner circumference edge of the rectangle hole l among the focusing coils g, and they are arranged so that two tracking coils h and h may be located in a line with a longitudinal direction.

[0013] A deer is carried out and the lens attachment component f moves such a biaxial actuator a to the vertical direction (the direction of focusing), or a horizontal direction (the direction of tracking) to the base substrate b by supplying electric power to the focusing coil g or the tracking coils h and h.

[0014]

[Problem(s) to be Solved by the Invention] However, if it is in the above-mentioned biaxial actuator a of the conventional optical pickup Since copper wire is wound and the focusing coil g and the tracking coils h and h are formed, Since it had a certain amount of thickness and the tracking coils h and h were laid on top of the lateral surface of the focusing coil g, spacing between Magnet j and the outside yoke n had to be enlarged, Field o became long, and there was a problem that actuation effectiveness was bad.

[0015] If the actuation effectiveness of the biaxial actuator a is bad, if driver voltage of the biaxial actuator a is not made high, it will lack at stability, and the problem of actuation of a biaxial actuator stopping being stabilized by slight sag will arise.

[0016] If it is in the focusing coil g, since it is wound and formed in rectangular-head tubed, moreover, being located in Field o Utilization effectiveness is bad. the inside of the four sides -- one side -- it is -- an invalid -- a conductor -- a part -- many -- a conductor -- The miniaturization of the biaxial actuator a could not be attained, but especially, the weight of moving part (mainly the lens attachment component f, objective lens e, the focusing coil g, and the tracking coils h and h) became heavy among the biaxial actuators a, and there was a problem that a response property was bad.

[0017] Furthermore, in order to pile up in the parallel links d and d and the direction in which ... is prolonged, each actuation point of application has shifted in the direction of superposition, and the focusing coil g and the tracking coils h and h cannot make in agreement an actuation core and the center of gravity of the moving part (mainly the lens attachment component f, objective lens e, the focusing coil g, and the tracking coils h and h) of the biaxial actuator a, but have the problem that where of actuation of moving part is not stabilized.

[0018] Furthermore, since the tracking coils h and h were laid on top of the lateral surface of the focusing coil g, there was a problem done according to the error of the superposition that the variation on a property arose for every product again.

[0019]

[Means for Solving the Problem] Then, the biaxial actuator of this invention optical pickup forms a focusing coil and a tracking coil as a circuit pattern on the same flat surface of a printed circuit board, in order to solve the above-mentioned technical problem.

[0020]

[Function] Therefore, according to this invention optical pickup, since the focusing coil and the tracking coil were formed on the same flat surface as a circuit pattern at the printed circuit board, a focusing coil

and a tracking coil can be made thin, and the gap of a magnet and a yoke, i.e., the die length of a field, can be shortened, and while being able to improve actuation effectiveness and being able to carry out actuation of a biaxial actuator to stability, thereby, a miniaturization can be attained.

[0021] moreover -- since the focusing coil and the tracking coil were formed in the printed circuit board as a circuit pattern -- an invalid -- a conductor -- a part -- few -- a conductor -- utilization effectiveness can be good, moving part can be made lightweight among biaxial actuators by this, and the response property of a biaxial actuator can be raised.

[0022] Furthermore, since the focusing coil and the tracking coil were formed on the same flat surface, each actuation point of application cannot shift, an actuation core and the center of gravity of the moving part of a biaxial actuator can be made in agreement, and the actuation by which moving part was stabilized can be obtained.

[0023] Furthermore, since the focusing coil and the tracking coil were formed on the same flat surface, there is no need of piling up a tracking coil and a focusing coil like before, the variation in the property for every product by superposition does not arise, and equalization of quality can be attained again.

[0024]

[Example] Below, it explains according to an example 1 of the operation which showed the detail of the biaxial actuator of this invention optical pickup to the accompanying drawing.

[0025] the base substrate 2 with which the biaxial actuator 1 consists of a magnetic metallic material, and an objective lens 3 -- holding -- the base member 2 -- the parallel links 4 and 4 -- it consists of the lens attachment component 5 supported through ..., the yoke 6 formed in the above-mentioned base substrate 2, the magnet 7 attached in this yoke 6, and the coil substrate 8 grade supported by the above-mentioned lens attachment component 5.

[0026] The base substrate 2 succeeds in an abbreviation rectangle in a flat-surface configuration, and is a front end edge (the direction which goes to the right slanting lower part in drawing 1 is made into a before side, and the direction which goes to the left slanting upper part is made into the backside.) to the location of the both-sides approach of the front end section. Moreover, let the direction which makes the direction which goes to the right slanting upper part left-hand side, and goes to a left slanting lower part be right-hand side. When the following explanation sets and the sense is shown, it shall depend in this direction. Two slits are formed so that opening may be carried out. Raise the part between these slits and a yoke 9 is formed the outside of the above-mentioned yokes 6. Moreover, a slit is formed in the shape of [ of the sense which carries out opening to the part between the yoke 9 outside this, and the back end edge of the base substrate 2 at the outside yoke 9 side ] a KO character. By raising the part surrounded by this slit, the inner yoke 10 of the yokes 6 is formed, and proper spacing is formed between these outside yoke 9 and the inner yoke 10.

[0027] Tabular [ of an oblong rectangle ] is carried out, a unlike pole is magnetized so that it may divide into two equally at the longitudinal direction, and the magnet 7 is attached in the field which counters a yoke 9 outside the yoke 10 in the above. By this A magnetic circuit called the gap-magnet 7 between the yoke 9outside yoke 10-base substrate 2--magnet 7 and the outside yoke 10 is formed in magnet 7-, and a field 11 arises between a magnet 7 and the outside yoke 9.

[0028] In addition, although the magnet 7 magnetized a polarity which is different in the die-length direction in the one magnetic substance, not only this but two magnets may be arranged right and left so that the polarities may differ in the direction of a field.

[0029] 12 is the biaxial electrode holder set up by the back end section of the base substrate 2, and tabular [ of the oblong rectangle which consists of an insulating material ] is carried out, and the slits 12a and 12a prolonged in the location of the right-and-left ends approach in a lengthwise direction are formed so that the upper bed may carry out opening.

[0030] It consists of the metal wire rod with which the parallel links 4 and 4 and ... have conductivity, and is implanted in the four corners of the rectangular printed circuit board 13, and this printed circuit board 13 is attached so that it may stick on the tooth back of the biaxial electrode holder 12 with the sense to which the parallel links 4 and 4 of four and ... extend to the front.

[0031] And each parallel links 4 and 4 and ... have the inside of slit 12a of the above-mentioned biaxial

electrode holder 12, and 12a let it pass, and it fills up with adhesives in this slit 12a and 12a, and is supported by the biaxial electrode holder 12.

[0032] The lens attachment component 5 succeeds in tabular [ which consists of an insulating material ], it sees at a flat surface and the rear half succeeds in the shape of an abbreviation rectangle, a configuration which is deflected in the center is carried out as the left right-hand side edge of the front half goes to the front, the long rectangle hole 14 is formed in the abbreviation center section at a longitudinal direction, and the above-mentioned objective lens 3 is supported by the front end section.

[0033] The rectangle hole 14 formed in the lens attachment component 5 is somewhat larger than the flat-surface configuration where the magnitude doubled the gap between the yoke 9 outside the above, the inner yoke 10, a magnet 7, and the outside yoke 9 and a magnet 7, and it is formed, and the lens attachment component 5 is in the condition supported by the above-mentioned parallel links 4 and 4 and ..., and the outside yoke 9, the inner yoke 10, and a magnet 7 are located in the rectangle hole 14.

[0034] Although the thickness of the whole is formed smaller than spacing between what the above-mentioned parallel links 4 and 4 and ... estranged up and down, such a lens attachment component 5 Similarly it is formed. the inside of the part of right-and-left both the sides of the rectangle hole 14 -- a before side -- the part of others [ part / \*\*\*\*\* ] -- \*\* -- spacing between the parallel links 4 and 4 thickly estranged to the above-mentioned upper and lower sides, and abbreviation -- moreover, spacing between the parallel links 4 and 4 which are the parts on the backside [ hole / 14 / rectangle ], and were estranged right and left -- \*\* -- the narrow part 15 -- lower part HE \*\* -- it is formed thickly.

[0035] And the heavy-gage part of both the sides of the above-mentioned rectangle hole 14 is used as the parallel links 4 and 4 and the supporters 16 and 16-ed with which the point of ... is combined, and let the heavy-gage part 15 on the backside [ the rectangle hole 14 ] be the balancer section for maintaining the weight balance of the lens attachment component 5 concerned. The magnitude is determined that the balancer section 15 makes in agreement the center of gravity of the lens attachment component 5 concerned, and the actuation core by the coil substrate so that it may mention later.

[0036] 17 and 17 are the notches which cut, and were lacked and formed so that the part corresponding to the above-mentioned supporters 16 and 16-ed of the above-mentioned rectangle hole 14 might be penetrated up and down.

[0037] The coil substrate 8 succeeds in the \*\*\*\* configuration which the four corners cut with the abbreviation rectangle aslant, and lacked with it. Furthermore, by right-and-left edges' on both sides projecting slightly to a left and the method of the right, making them into the fitting-ed sections 18 and 18, and carrying out fitting of these fitting-ed sections 18 and 18 to the above-mentioned notches 17 and 17 of the rectangle hole 14, the coil substrate 8 is located in the rectangle hole 14, and is in the condition. From the top face or underside of the supporters 16 and 16-ed, the vertical ends edge of the fitting-ed sections 18 and 18 projects slightly to the upper part or a lower part, and is located to it.

[0038] The coil substrate 8 piles up the printed circuit boards 8a, 8b, 8c, and 8d of the thin meat of four sheets, and is formed, and the focusing coil elements 19 and 19, ... and the tracking coil elements 20 and 20, and ... are formed in the printed circuit boards 8a, 8b, 8c, and 8d of each \*\*\*\* as a circuit pattern.

[0039] in addition, each circuit pattern formed in the printed circuit boards 8a, 8b, 8c, and 8d of four sheets -- abbreviation -- since it is formed in the same configuration, only printed circuit board 8a of 1 is explained, and the explanation about other printed circuit boards 8b, 8c, and 8d is omitted.

[0040] A circuit pattern is formed and the tracking coil element 20 is formed so that the eddy of a longwise rectangle may be wound around the center section of printed circuit board 8a of thin meat. Moreover, a circuit pattern is formed in the four corners so that it may whirl around in the shape of [ which excised the rectangular corner aslant ] an anomaly, and the focusing coil elements 19 and 19 and ... are formed so that the tracking coil element 20 may be surrounded. It is arranged so that it may become these four focusing coil elements 19 and 19 and the point symmetry [ ... ] centering on the core of light-gage printed circuit board 8a.

[0041] 21, 21, and ... are formed in every place of light-gage printed circuit board 8a, and it is a through hole, and when the light-gage printed circuit boards 8a, 8b, 8c, and 8d of four sheets are piled up, it is for connecting the focusing coil elements 19 and 19 of the light-gage printed circuit board 8 of 1, ... or

the tracking coil element 20 and the focusing coil elements 19 and 19 of other light-gage printed circuit boards 8, ..., or the tracking coil element 20, respectively.

[0042] 22 and 22 are the feed terminals formed in the upper bed section and the soffit section of a location corresponding to the fitting-ed section 18 on the left-hand side of light-gage printed circuit board 8a with the circuit pattern, respectively, and are for supplying electric power to the focusing coil 23 and the tracking coil 24 at each \*\*. These feed terminals 22 and 22 are formed in light-gage printed circuit board 8a and 8d of light-gage printed circuit boards of the 4th layer of the 1st layer. In addition, as a coil substrate 8 In the focusing coils 23, two feed terminal 22au(s) (upper part on the left-hand side of [ of the 1st layer ] light-gage printed circuit board 8a), 22du(s) (upper part on the right-hand side of 8d of the 4th layer of light-gage printed circuit boards) -- moreover, two feed terminal 22ad(s) (lower part on the left-hand side of [ of the 1st layer ] light-gage printed circuit board 8a) and 22dd (lower part on the right-hand side of 8d of the 4th layer of light-gage printed circuit boards) are formed in the tracking coils 20.

[0043] Such light-gage printed circuit boards 8a, 8b, 8c, and 8d pile up, and the coil substrate 8 is formed. Plating is performed for each focusing coil elements 19 and 19, ... or the tracking coil elements 20 and 20, and ... to the above-mentioned through holes 21 and 21 and ..., and electrical installation is planned. Moreover, by this The focusing coil elements 19 and 19 and ... constitute one focusing coil 23, and the tracking coil elements 20 and 20 and ... constitute one tracking coil 24.

[0044] The lens attachment component 5 in which such a coil substrate 8 was attached is located so that it may be pinched between the heads of the parallel links 4 and 4 where the supporters 16 and 16-ed counter up and down. The parallel links 4 and 4 and the vertical ends edge of the point of ... and both insertion \*\*\*\* 18 and 18 of the coil substrate 8 are combined by soldering, respectively. By this Electrical installation with the above-mentioned feed terminals 22 and 22 formed in the coil substrate 8, the ... and parallel links 4 and 4, and ... is planned. Moreover, the lens supporter material 5 is attached between the parallel links 4 and 4 and the head of ... while being combined with the coil substrate 8 by piling solder in the supporters 16 and 16-ed, and it is supported free [ migration to the vertical direction and a horizontal direction ] to the base substrate 2. In addition, the coil substrate 8 may be beforehand attached in the notches 17 and 17 of the lens attachment component 5 with adhesives.

[0045] And between a magnet 7 and the outside yoke 9 (i.e., the inside of a field 11), after the lens attachment component 5 has been supported by the base substrate 2 through the parallel links 4 and 4 and ..., it approaches and the above-mentioned coil substrate 8 is located so that a magnet 7 and the outside yoke 9 may not be contacted.

[0046] Moreover, the lens attachment component 5 is set in the condition that external force has not joined this. 24l. of left-hand side parts counters 7l. of parts on the left-hand side of a magnet 7 among upper part 23ldu(s) and the tracking coils 24 of partial 23ld located in lower part 23lud and the lower left of partial 23lu located in the upper left among the focusing coils 23. Again Right-hand side partial 24r counters partial 7r on the left-hand side of a magnet 7 among upper part 23rdu(s) and the tracking coils 24 of partial 23rd located in lower part 23rud and the lower right of partial 23ru located in the upper right among the focusing coils 23. (Refer to drawing 8 ) .

[0047] The direction same when a deer is carried out and electric power is supplied by the focusing coil 23 as upper part 23ldu of partial 23ld located in lower part 23lud and the lower left of partial 23lu located in the upper left among the focusing coils 23, for example, the part 23 which the other current flows to the left and is located in the upper right among the focusing coils 23 -- upper part 23rdu of partial 23rd located in lower part 23rud and the lower right of ru -- partial 23lud of the above-mentioned left-hand side, and 23ldu(s) -- the direction of reverse -- that is Since the polarities of the magnets 7l. and 7r with which the other current flows to the method of the right, and these counter it, respectively differ, The migration force to the direction same as a coil substrate 8 will arise, and the lens attachment component 5 will be moved in the vertical direction of focusing, i.e., the direction, to the base substrate 2.

[0048] Moreover, although a current will flow toward a direction which is different in 24l. of left-hand side parts of the tracking coil 24, and right flank part 24r if electric power is supplied by the tracking



coil 24 Since polar magnets 7l. and 7r different, respectively from 24l. of left flank parts and right flank part 24r are countered, the migration force to the direction same as a coil substrate 8 will arise, and the lens attachment component 5 will be moved in the horizontal direction of tracking, i.e., the direction, to the base substrate 2.

[0049] moreover, the core of the driving force produced by supplying electric power to the core and the tracking coil 24 of driving force which are produced by supplying electric power to the focusing coil 23 -- these coils 23 and 24 -- an abbreviation same flat-surface top -- and since each is formed in the core in the core of the coil substrate 8 at point symmetry, it becomes an abbreviation same point and an actuation core is in agreement by migration in the direction of focusing, and migration in the direction of tracking. Moreover, since the actuation core turns into an abbreviation center of gravity of the coil substrate 8, it can stabilize actuation of the lens attachment component 5 by determining that the magnitude of the above-mentioned balancer section 15 will be in agreement with the center of gravity of the coil substrate 8 in the center of gravity of the whole lens attachment component 5.

[0050]

[Effect of the Invention] The biaxial actuator of this invention optical pickup is characterized by forming a focusing coil and a tracking coil as a circuit pattern on the same flat surface of a printed circuit board so that clearly from the place indicated above.

[0051] Therefore, according to this invention optical pickup, since the focusing coil and the tracking coil were formed on the same flat surface as a circuit pattern at the printed circuit board, a focusing coil and a tracking coil can be made thin, and the gap of a magnet and a yoke, i.e., the die length of a field, can be shortened, and while being able to improve actuation effectiveness and being able to carry out actuation of a biaxial actuator to stability, thereby, a miniaturization can be attained.

[0052] moreover -- since the focusing coil and the tracking coil were formed in the printed circuit board as a circuit pattern -- an invalid -- a conductor -- a part -- few -- a conductor -- utilization effectiveness can be good, moving part can be made lightweight among biaxial actuators by this, and the response property of a biaxial actuator can be raised.

[0053] Furthermore, since the focusing coil and the tracking coil were formed on the same flat surface, each actuation point of application cannot shift, an actuation core and the center of gravity of the moving part of a biaxial actuator can be made in agreement, and the actuation by which moving part was stabilized can be obtained.

[0054] Furthermore, since the focusing coil and the tracking coil were formed on the same flat surface, there is no need of piling up a tracking coil and a focusing coil like before, the variation in the property for every product by superposition does not arise, and equalization of quality can be attained again.

[0055] In addition, it does not pass over the concrete configuration thru/or the structure of each part shown in the above-mentioned example to what showed a mere example of the somatization which is in charge of operation of the biaxial actuator of this invention optical pickup, and the technical range of this invention must not be restrictively interpreted by these.

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## DESCRIPTION OF DRAWINGS

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### [Brief Description of the Drawings]

[Drawing 1] An example of operation of the biaxial actuator of this invention optical pickup is shown with drawing 2 and drawing 8 , and this Fig. is a perspective view.

[Drawing 2] It is a top view.

[Drawing 3] It is the sectional view which meets the III-III line of drawing 2 .

[Drawing 4] Each coil element by the circuit pattern formed in the light-gage printed circuit board of each class with drawing 5 thru/or drawing 7 is shown, and this Fig. is a front view of the printed circuit board of the 1st layer.

[Drawing 5] It is the front view of the printed circuit board of the 2nd layer.

[Drawing 6] It is the front view of the printed circuit board of the 3rd layer.

[Drawing 7] It is the front view of the printed circuit board of the 4th layer.

[Drawing 8] It is the schematic diagram showing the physical relationship of each coil and a magnet.

[Drawing 9] It is the top view showing an example of the biaxial actuator of the conventional optical pickup.

[Drawing 10] It is the sectional view which meets X-X-ray of drawing 9 .

### [Description of Notations]

1 Biaxial Actuator

8 Coil Substrate (Printed Circuit Board)

19 Focusing Coil Element (Circuit Pattern)

20 Tracking Coil Element (Circuit Pattern)

23 Focusing Coil

24 Tracking Coil

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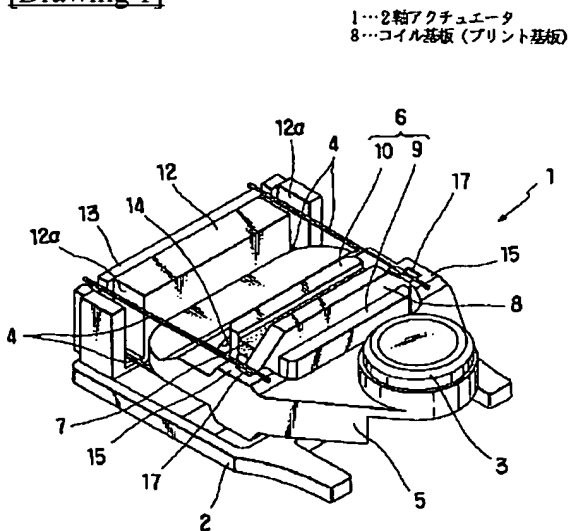
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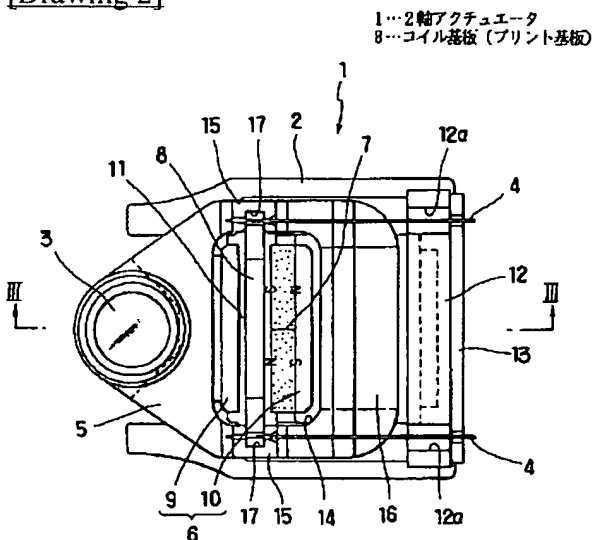
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## DRAWINGS

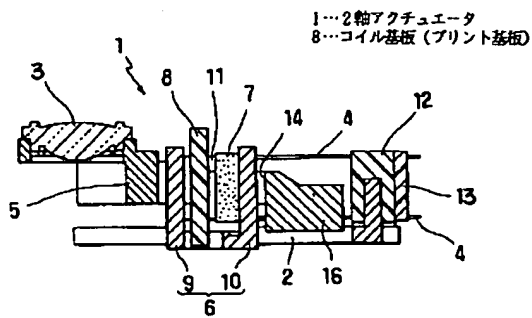
[Drawing 1]



[Drawing 2]

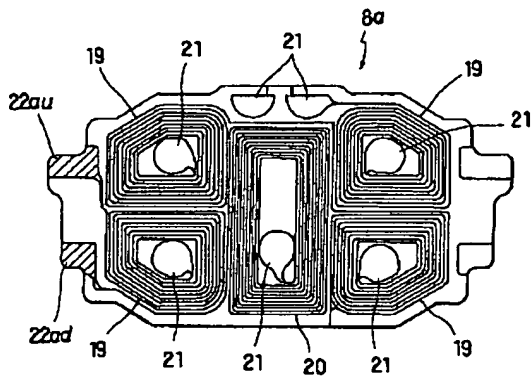


[Drawing 3]



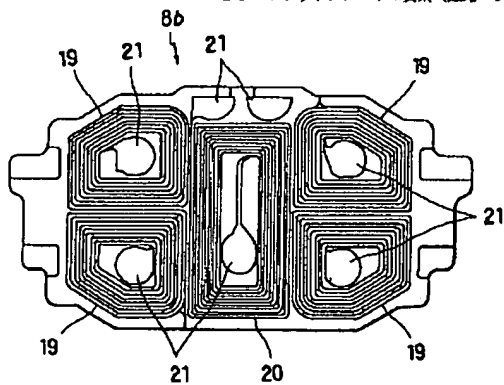
[Drawing 4]

8...コイル基板 (プリント基板)  
19...フォーカシングコイル要素 (回路パターン)  
20...トラッキングコイル要素 (回路パターン)



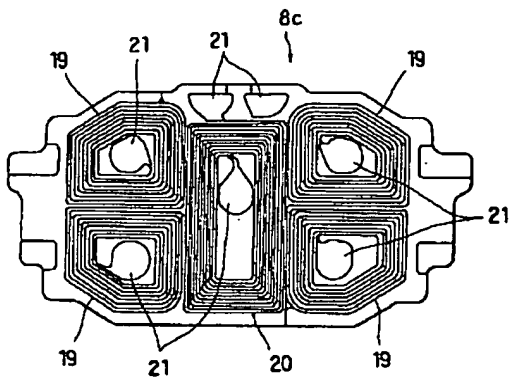
[Drawing 5]

8...コイル基板 (プリント基板)  
19...フォーカシングコイル要素 (回路パターン)  
20...トラッキングコイル要素 (回路パターン)



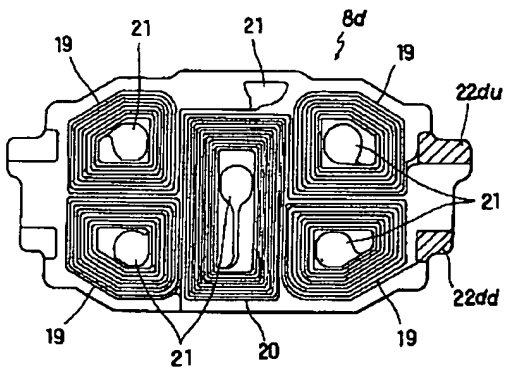
[Drawing 6]

- 8…コイル基板 (プリント基板)  
 19…フォーカシングコイル要素 (回路パターン)  
 20…トラッキングコイル要素 (回路パターン)



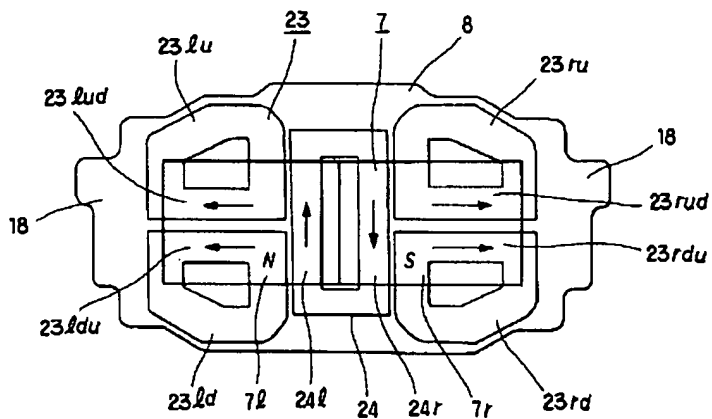
[Drawing 7]

- 8…コイル基板 (プリント基板)  
 19…フォーカシングコイル要素 (回路パターン)  
 20…トラッキングコイル要素 (回路パターン)

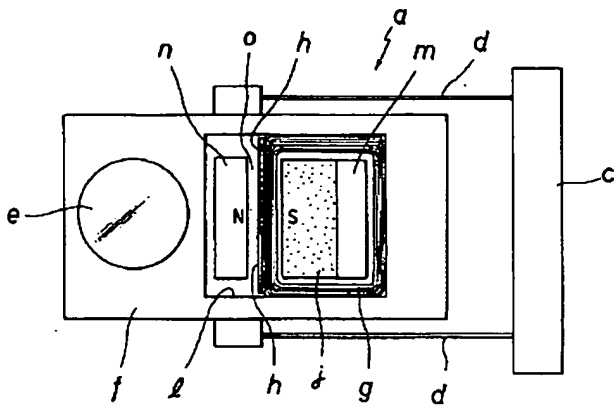


[Drawing 8]

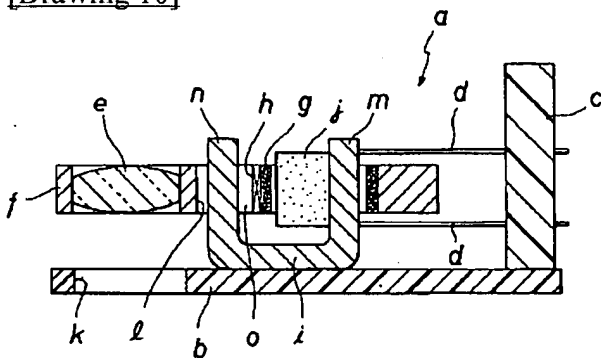
- 8…コイル基板 (プリント基板)  
 23…フォーカシングコイル  
 24…トラッキングコイル



[Drawing 9]



[Drawing 10]



[Translation done.]

## \* NOTICES \*

JPO and NCIPi are not responsible for any damages caused by the use of this translation.

1. This document has been translated by computer. So the translation may not reflect the original precisely.
2. \*\*\*\* shows the word which can not be translated.
3. In the drawings, any words are not translated.

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CORRECTION OR AMENDMENT

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[Kind of official gazette] Printing of amendment by the convention of 2 of Article 17 of Patent Law  
 [Category partition] The 4th partition of the 6th category  
 [Publication date] July 27, Heisei 13 (2001. 7.27)

[Publication No.] JP,7-93778,A  
 [Date of Publication] April 7, Heisei 7 (1995. 4.7)  
 [Annual volume number] Open patent official report 7-938  
 [Application number] Japanese Patent Application No. 5-256317  
 [The 7th edition of International Patent Classification]

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[FI]

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[Procedure amendment]  
 [Filing Date] August 9, Heisei 12 (2000. 8.9)  
 [Procedure amendment 1]  
 [Document to be Amended] Description  
 [Item(s) to be Amended] 0015  
 [Method of Amendment] Modification  
 [Proposed Amendment]  
 [0015] If the actuation effectiveness of the biaxial actuator a is bad, the sensibility of the biaxial actuator a will fall and the increment in the power consumption of a biaxial actuator and the problem of vibration resistance stopping stabilizing will arise.  
 [Procedure amendment 2]  
 [Document to be Amended] Description  
 [Item(s) to be Amended] 0025  
 [Method of Amendment] Modification  
 [Proposed Amendment]  
 [0025] the base substrate 2 with which the biaxial actuator 1 consists of a magnetic metallic material, and an objective lens 3 -- holding -- the base substrate 2 -- the parallel links 4 and 4 -- it consists of the lens attachment component 5 supported through ..., the yoke 6 formed in the above-mentioned base substrate 2, the magnet 7 attached in this yoke 6, and the coil substrate 8 grade supported by the above-mentioned lens attachment component 5.  
 [Procedure amendment 3]  
 [Document to be Amended] Description  
 [Item(s) to be Amended] 0031

[Method of Amendment] Modification

[Proposed Amendment]

[0031] And each parallel links 4 and 4 and ... have the inside of slit 12a of the above-mentioned biaxial electrode holder 12, and 12a let it pass, and it fills up with ultraviolet curing mold damping adhesives in this slit 12a and 12a, and is supported by the biaxial electrode holder 12.

[Procedure amendment 4]

[Document to be Amended] Description

[Item(s) to be Amended] 0035

[Method of Amendment] Modification

[Proposed Amendment]

[0035] And the heavy-gage part of both the sides of the above-mentioned rectangle hole 14 is used as the parallel links 4 and 4 and the supporters 15 and 15-ed with which the point of ... is combined, and let the heavy-gage part 16 on the backside [ the rectangle hole 14 ] be the balancer section for maintaining the weight balance of the lens attachment component 5 concerned. The magnitude is determined that the balancer section 16 makes in agreement the center of gravity of the lens attachment component 5 concerned, and the actuation core by the coil substrate so that it may mention later.

[Procedure amendment 5]

[Document to be Amended] Description

[Item(s) to be Amended] 0036

[Method of Amendment] Modification

[Proposed Amendment]

[0036] 17 and 17 are the notches which cut, and were lacked and formed so that the part corresponding to the above-mentioned supporters 15 and 15-ed of the above-mentioned rectangle hole 14 might be penetrated up and down.

[Procedure amendment 6]

[Document to be Amended] Description

[Item(s) to be Amended] 0037

[Method of Amendment] Modification

[Proposed Amendment]

[0037] The coil substrate 8 succeeds in the \*\*\*\* configuration which the four corners cut with the abbreviation rectangle aslant, and lacked with it, and further, right-and-left edges on both sides project slightly to a left and the method of the right, and let them be the fitting-ed sections 18 and 18 (refer to drawing 8), By carrying out fitting of these fitting-ed sections 18 and 18 to the above-mentioned notches 17 and 17 of the rectangle hole 14, the coil substrate 8 is located in the rectangle hole 14, and it is in the condition, and from the top face or underside of the supporters 15 and 15-ed, the vertical ends edge of the fitting-ed sections 18 and 18 projects slightly to the upper part or a lower part, and is located to it.

[Procedure amendment 7]

[Document to be Amended] Description

[Item(s) to be Amended] 0044

[Method of Amendment] Modification

[Proposed Amendment]

[0044] The lens attachment component 5 in which such a coil substrate 8 was attached is located so that it may be pinched between the heads of the parallel links 4 and 4 where the supporters 15 and 15-ed counter up and down. The parallel links 4 and 4 and the vertical ends edge of the point of ... and both insertion \*\*\*\* 18 and 18 of the coil substrate 8 are combined by soldering, respectively. By this While being combined with the coil substrate 8 by piling solder in the supporters 15 and 15-ed by planning electrical installation with the above-mentioned feed terminals 22 and 22 formed in the coil substrate 8, the ... and parallel links 4 and 4, and ..., as for the lens supporter material 5 It is attached between the parallel links 4 and 4 and the head of ..., and is supported free [ migration to the vertical direction and a horizontal direction ] to the base substrate 2. In addition, the coil substrate 8 may be beforehand attached in the notches 17 and 17 of the lens attachment component 5 with adhesives.



[Procedure amendment 8]

[Document to be Amended] Description

[Item(s) to be Amended] 0049

[Method of Amendment] Modification

[Proposed Amendment]

[0049] moreover, the core of the driving force produced by supplying electric power to the core and the tracking coil 24 of driving force which are produced by supplying electric power to the focusing coil 23 -- these coils 23 and 24 -- an abbreviation same flat-surface top -- and since each is formed in the core in the core of the coil substrate 8 at point symmetry, it becomes an abbreviation same point and an actuation core is in agreement by migration in the direction of focusing, and migration in the direction of tracking. Moreover, since the actuation core turns into an abbreviation center of gravity of the coil substrate 8, it can stabilize actuation of the lens attachment component 5 by determining that the magnitude of the above-mentioned balancer section 16 will be in agreement with the center of gravity of the coil substrate 8 in the center of gravity of the whole lens attachment component 5.

[Procedure amendment 9]

[Document to be Amended] DRAWINGS

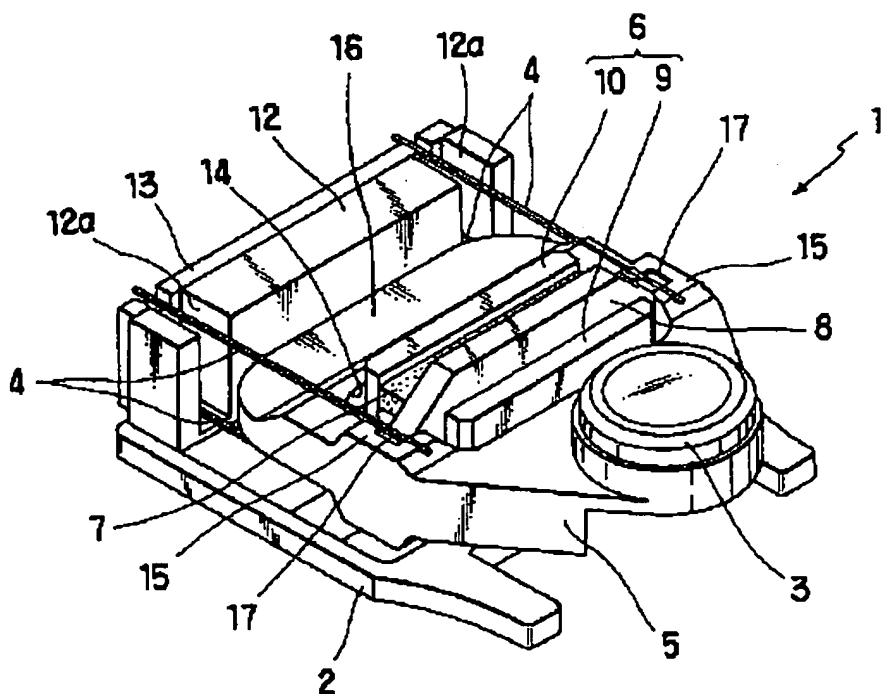
[Item(s) to be Amended] drawing 1

[Method of Amendment] Modification

[Proposed Amendment]

[Drawing 1]

1...2軸アクチュエータ  
8...コイル基板 (プリント基板)



[Translation done.]